Cost Pressures on Manufacturing

by

Thomas J. Duesterberg
President and Chief Executive Officer
Manufacturers Alliance/MAPI

to

VMA - The Virginia Manufacturers Association
For the Joint Sub-Committee Studying
Manufacturing Needs and the Future of
Manufacturing In Virginia
Philip Morris Auditorium
Richmond, Virginia
August 17, 2004

About the Manufacturers Alliance/MAPI

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- Celebrating our 71st anniversary
- Over 450 member companies representing well over $2 trillion in annual sales
- Leading economic research organization for manufacturers
- Highly acclaimed network of over 1,700 senior executives in 24 functional-oriented Councils which meet twice a year; special topical meetings as member needs arise
- Member-driven research, including benchmarking surveys, management studies, leading indicators for manufacturing sector, and policy analysis
- Just-released book—*U.S. Manufacturing: The Engine for Growth in a Global Economy (2003)*

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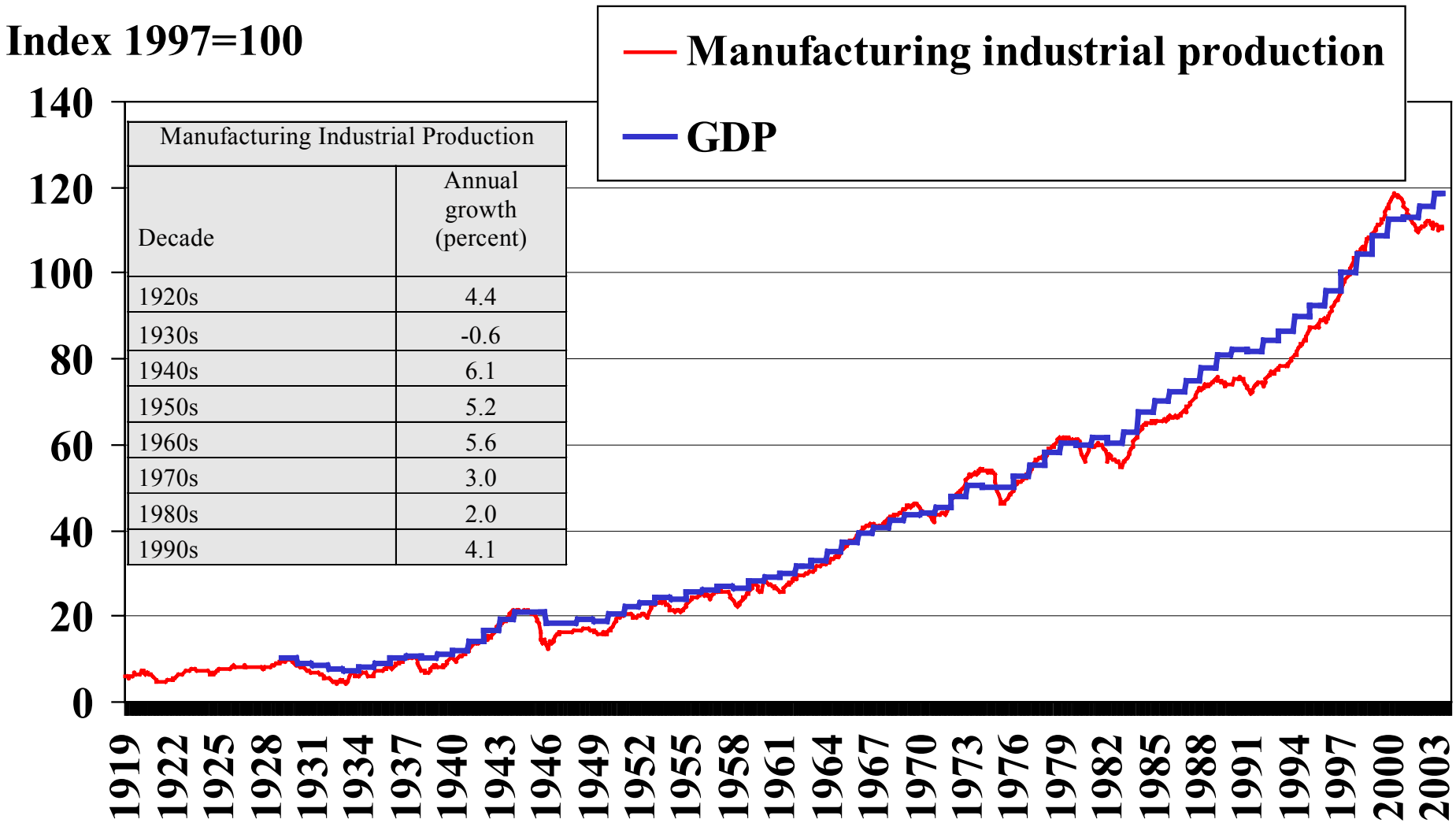
Overview

- Principal Themes
  - 1. Manufacturing still Vital part of U.S. Economy
  - 2. Manufacturing Is Evolving into a “Solutions-Based,” High Innovation Model
  - 3. Commitment to Technology and Innovation Key to Sustaining Competitiveness and Productivity Growth
  - 4. Manufacturing Sector Leading in Innovation and Productivity; Benefits Spread to Other Sectors; Manufacturing Is Engine for Growth
  - 5. U. S. Manufacturing Is In Recovery Phase, but Challenges Remain
  - 6. Cost Pressures Facing Manufacturers; Many are Policy-Related
  - 7. Meeting the Challenge in Virginia and Nationally

Manufacturing Increases Our Standard of Living



Manufacturing Industrial Production	
Decade	Annual growth (percent)
1920s	4.4
1930s	-0.6
1940s	6.1
1950s	5.2
1960s	5.6
1970s	3.0
1980s	2.0
1990s	4.1

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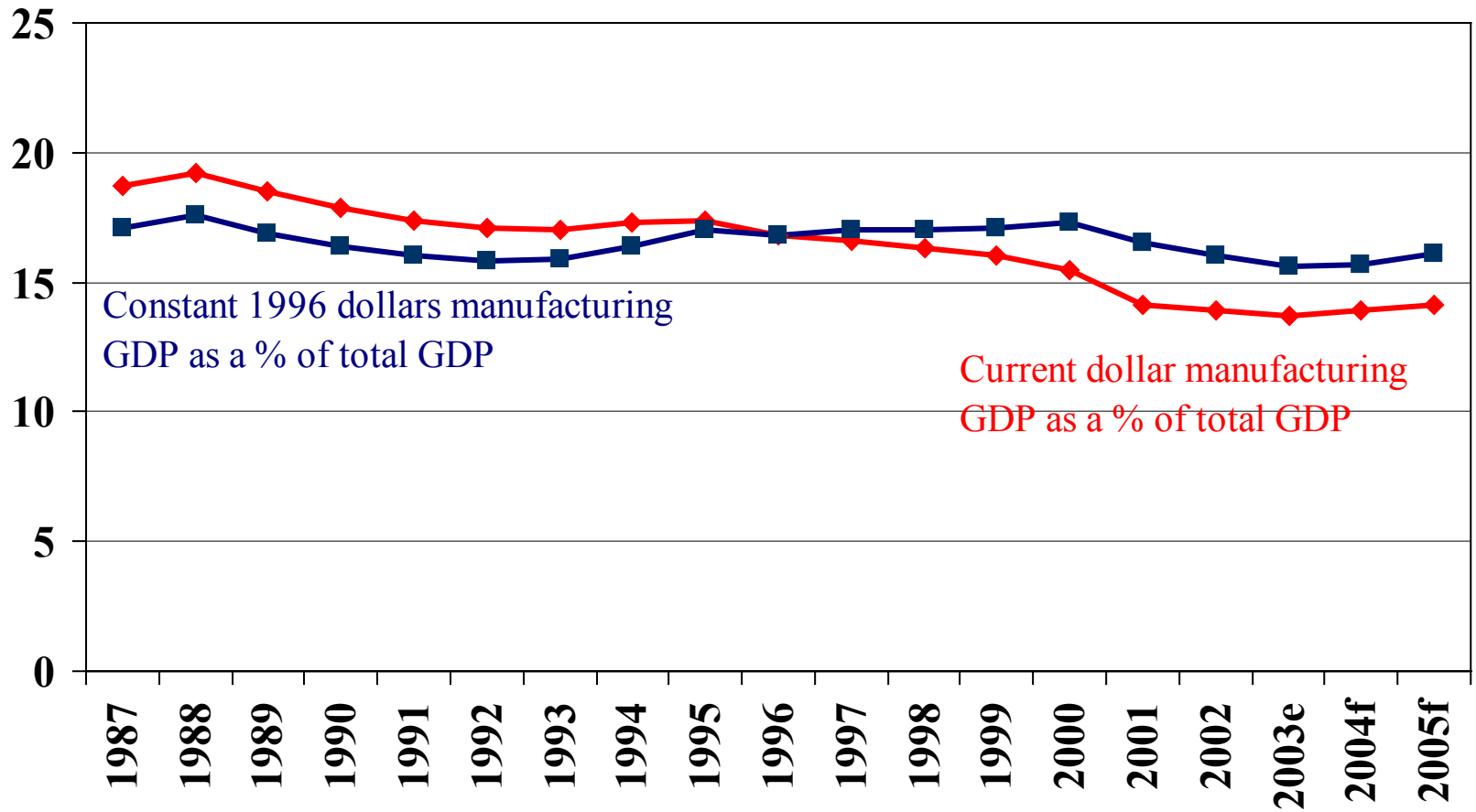
Value Added By Industry as a Percentage of Gross Domestic Product

Industry	2003	1998-2003 Percentage point change
Manufacturing	12.7	-2.7
Wholesale trade	5.9	-0.4
Transportation and warehousing	2.8	-0.3
Agriculture, forestry, fishing, and hunting	1.0	-0.2
Utilities	1.9	-0.1
Administrative, waste management services	2.8	-0.1
Accommodation and food services	2.6	-0.1
Other services, except government	2.4	0.0
Construction	4.4	0.1
Educational services	0.9	0.1
Arts, entertainment, and recreation	1.0	0.1
Management of companies and enterprises	2.0	0.2
Government	12.7	0.2
Mining	1.1	0.3
Retail trade	7.2	0.4
Professional, scientific, and technical services	6.9	0.4
Information	4.9	0.5
Finance and insurance	7.9	0.5
Real estate and rental and leasing	12.4	0.5
Health care and social assistance	6.8	0.7
Total Gross Domestic Product**	100.0	0.0

Manufacturing Share of GDP, 1987-2005



Source: BEA and Manufacturers Alliance/MAPI projections

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Global Trade in Manufactured Goods Has Grown Dramatically Over Last Decade

	1990		2002		
	$ billions	Percent of World Exports	$ billions	Percent of World Exports	Avg annual growth (%)
World Exports	**2390**	**100**	**4708**	**100**	**8.1**
United States	290	12.1	569	12.1	8.0
Canada	73	3.1	159	3.4	9.8
Mexico	25	1.0	135	2.9	36.7
NAFTA Total	**388**	**16.2**	**863**	**18.4**	**10.2**
EU (15)	1203	50.3	2003	42.5	5.5
Western Europe Total	**1312**	**54.9**	**2144**	**45.5**	**5.3**
Japan	275	11.5	388	8.2	3.4
South Korea	61	2.6	149	3.2	12.0
China	44	1.8	293	6.2	47.2
ASEAN	84	3.5	300	6.4	21.4
East Asia Total	**553**	**23.1**	**1130**	**24.0**	**8.7**
Other	**137**	**5.7**	**571**	**12.1**	**26.4**

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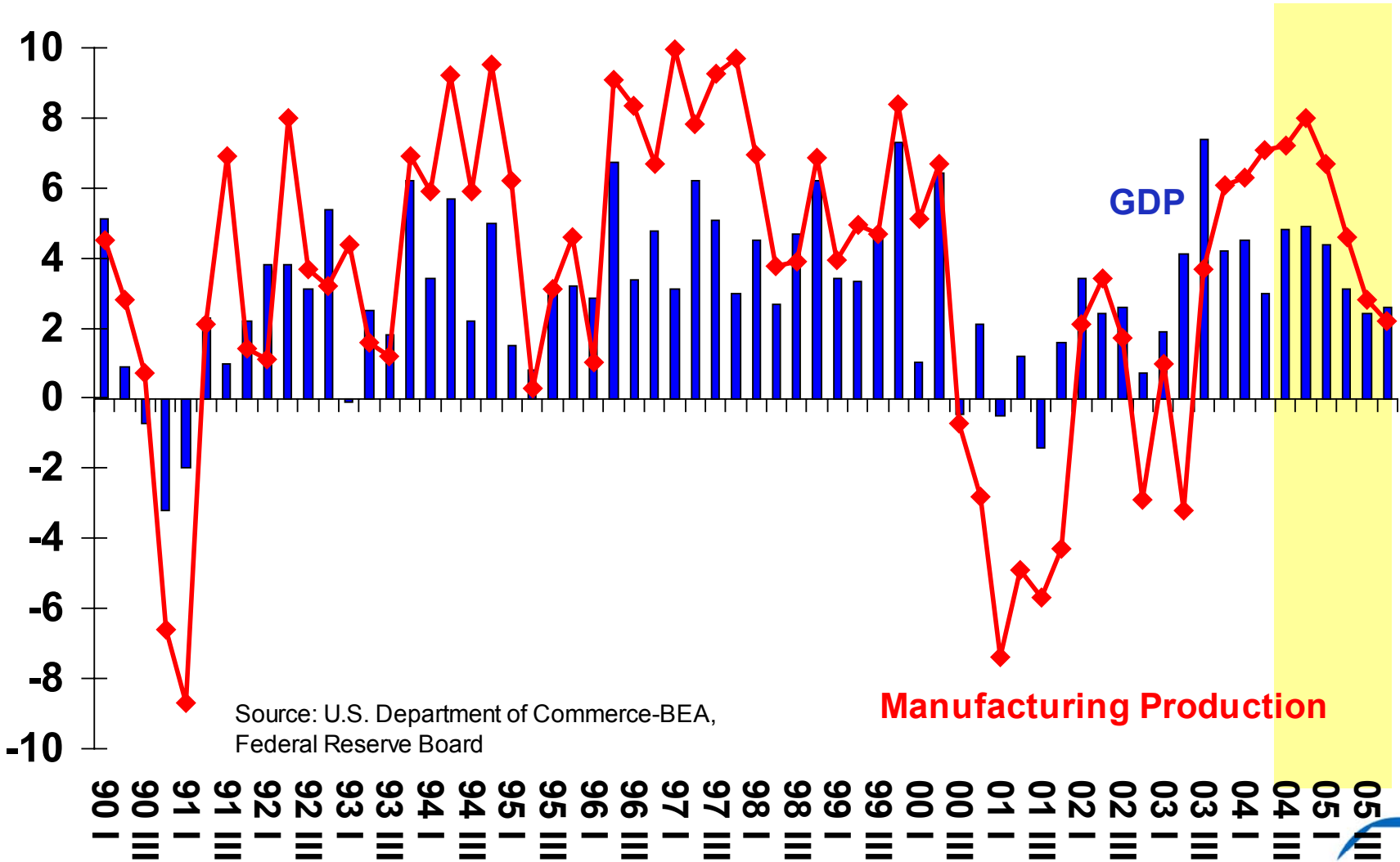
Sectoral Shares of World Exports, 1990-2002

(Percent)

	1990	1995	2000	2002
Manufactures	58	62	63	60
Agricultural products	11	10	8	7
Mineral fuels	9	6	8	10
Nonagricultural raw materials	3	3	2	3
Services	19	19	19	20

Source: World Trade Organization, *International Trade Statistics*

MAPI Forecast:
Total Economy and Manufacturing Growth
(Quarter-to-quarter percentage change at annual rate)



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MAPI Economic Forecast

Inflation Adjusted--(% Chg.)	Actual 2003	Forecast 2004	Forecast 2005
GDP	3.1	4.5	3.7
Consumption	3.1	3.7	3.1
Durables	7.4	5.5	4.0
Nondurables	3.8	4.5	3.0
Services	2.0	3.0	2.9
Equipment & Software	5.5	12.4	6.8
Information Processing Equipment	13.8	15.3	6.0
Industrial Equipment	-3.6	2.2	4.5
Transportation equipment	-9.1	11.0	13.3
Structures	-4.6	0.9	5.9
Residential	7.5	8.2	-2.9
Exports	2.0	11.1	11.5
Imports	4.0	9.5	5.0
Federal Government	8.7	5.5	1.6
State & Local Government	0.5	0.8	2.6
Total Manufacturing Production	0.3	6.0	5.7
Computers and Electronics	13.8	19.6	16.6
Everything Else	-0.9	3.7	3.0

Source: Manufacturers Alliance/MAPI simulation of the Global Insight model, July 29, 2004

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U.S. Manufacturing Is the Engine of Innovation-Led Growth

- Accounts for over 70 percent of business-sector R&D (concentrated in computer and electronic products, transportation equipment, chemicals, and industrial machinery).
- Accounts for 50 percent of technology-related royalties and license fees received from foreign companies.
- Accounts for at least 90 percent of all U.S. patent approvals.
- Accounts for 80 percent of all domestic capital goods sales (not including $300+ billion annual sales abroad).
- Manufacturing supports six jobs outside sector for every $1million in sales, compared to two jobs in services sector; and $1.19 in output outside the sector for every $1.00 in sales, compared to $.77 cents for service sector.
- Workers in Manufacturing are paid on average 18 percent more than the national average.

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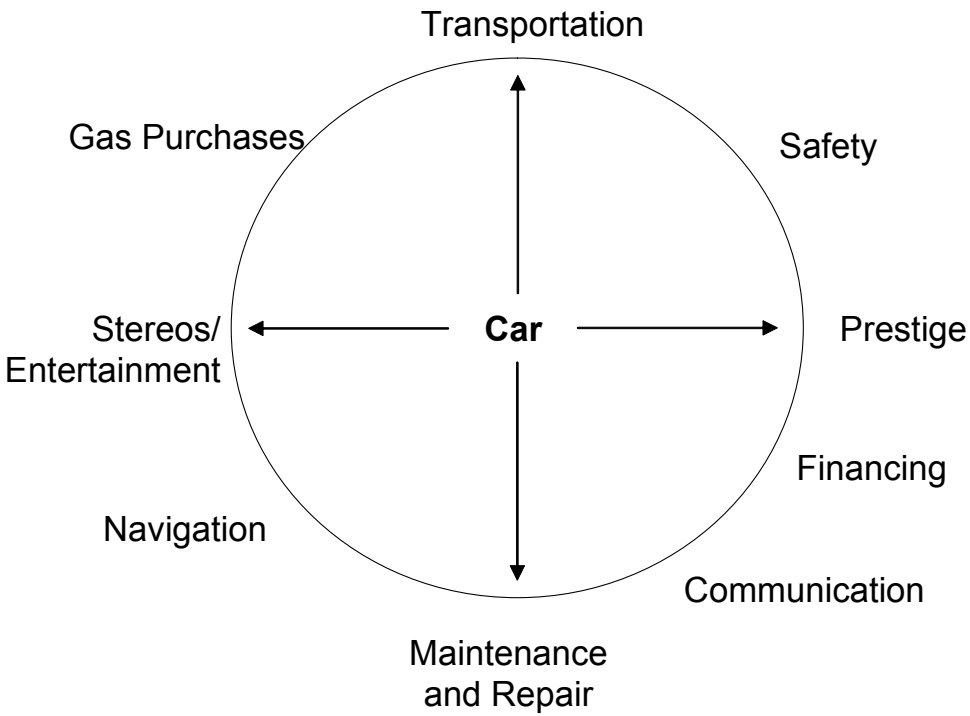
Manufacturing is Broadening Value Added Beyond Products to "Solutions"

- The market for products that improve living standards will continue to grow. To meet this demand companies will have to adopt more flexible production techniques.
- Value added will move from manufacturing to activities associated with the design, engineering, marketing, and organization of products.
- The rapid development of information technology is creating a new class of products for both consumer and industrial markets.
- Better use of information radically transforms supply chains. Rather than producing products and then trying to sell them, companies are providing solutions to specific customer problems.
- The organizational change needed to take advantage of these trends is usually difficult to implement. Change needs support from cultural, social, and legal institutions—as well as strong leadership at corporate level.

Manufacturers are becoming "solution providers"

- Distinction between manufacturing & services is eroding. Much of the value added by products is in embedded or accompanying services.
- Firms add services to capture a higher proportion of the total value added and build a closer relationship with their customer. Also, service activities often provide a more stable source of revenue.
- As companies concentrate on core competencies, customers increasingly demand total solutions from their suppliers.
- For example, many capital equipment makers are providing capital asset management services:
  - Design, leasing, installation, operations;
  - Preventative maintenance, diagnostics, repair;
  - Cross-platform capabilities.

Complementary Goods and Services Associated With an Automobile



Source: Manufacturers Alliance/MAPI

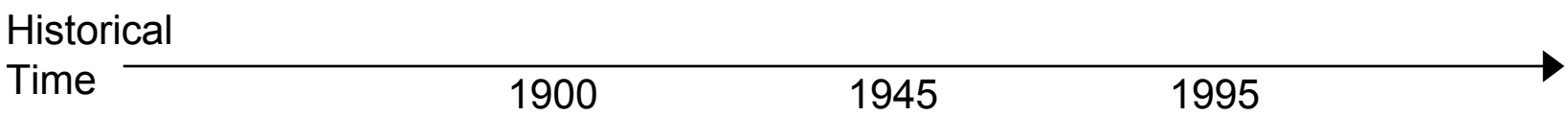
Manufacturing is evolving to a new species.

Lean Manufacturing
- Flow Production
- Flexible Tools
- Short Product Life
- Produce to customer demand

Mass Production
- Volume Manufacturing
- Large Buffers
- Long Throughput
- Build to forecast

Henry Ford
- Flow Production
- Dedicated Tools
- Long Product Life
- Unlimited demand, zero variety

Craft
- One-off Products
- Flexible, simple tools
- Quality through tinkering
- Build to order



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Survival Ratios for New U.S. Manufacturing Plants, 1967-1997

(Percent that survive in 5-year increments)

Number of new plants	1967	1972	1977	1982	1987	1992	1997
97,285	100	52	36	25	19	14	11
119,250		100	54	36	26	19	15
145,562			100	49	32	23	17
130,106				100	56	36	27
132,106					100	50	34
143,238						100	53

Source: Michael Gort, The Survival of Industrial Plants, Center for Economic Studies, U.S. Bureau of Census, October 2002

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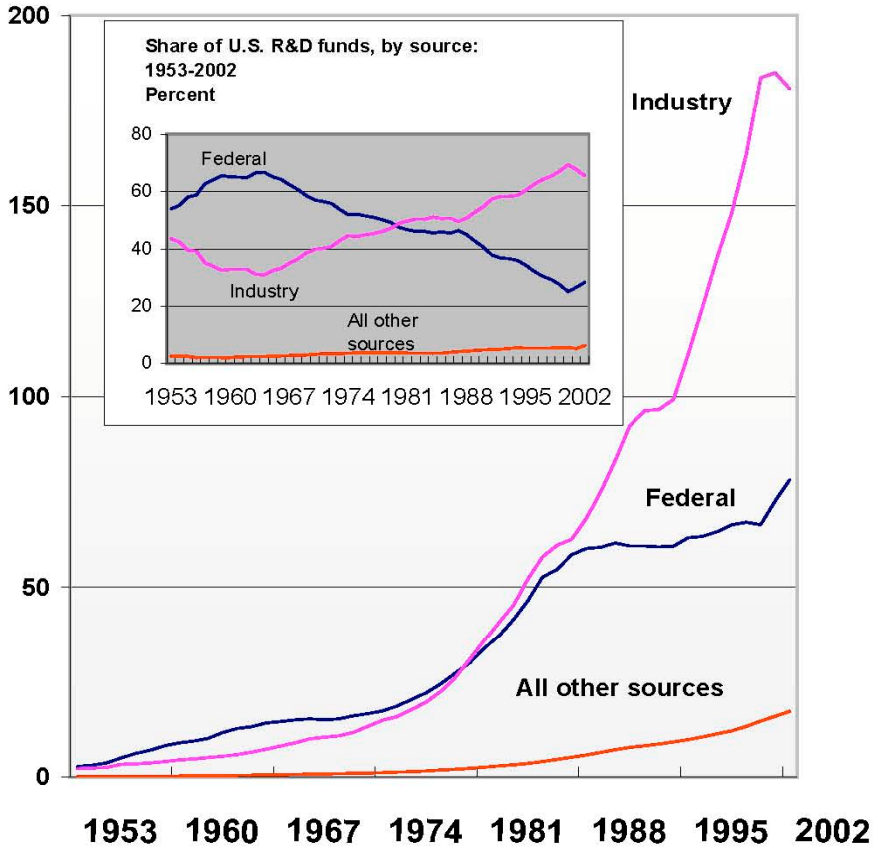
Technology Increasingly Drives Growth and U.S. Has Global Technology Lead

- Innovation has become the central pillar of long-run economic growth
- Technology improvement accounts for approximately one-third of growth in 1995-1999
- U.S. investment and R&D concentrated in manufacturing
- U.S. investment higher than foreign competitors; and more efficient
- Rate of technology change embedded in products and processes has dramatically accelerated

U.S. R&D Funding by Business and the Federal Government, 1953-2002

(Billions of dollars)



NOTE: Other sources include nonprofit, academic, and non-Federal government.

SOURCES: National Science Foundation, Division of Science Resources Statistics, National Patterns of R&D Resources; annual series. See appendix table 4-5

Distribution of U.S. Patent Approvals by Major Industrial Sectors, 1963-1995 and 1996-2000

(Percent of total)

	SIC Code	1963-1995	1996-2000
All manufacturing industries	**N/A**	**91.8**	**92.1**
Electrical and electronic machinery	36	19.6	26.1
Machinery, except electrical	35	23.5	22.1
Professional and scientific instruments	38	11.9	13.7
Chemical and allied products	28	14.4	13.6
Other manufacturing industries	N/A	22.4	16.6
All nonmanufacturing industries	**N/A**	**8.2**	**7.9**

Source: U.S. Patent and Trademark Office

Top Company Patent Holders, 2004 by Industry

(Top Five and Number of U.S. Firms Among Top World Companies)

AEROSPACE
Lockheed Martin Corp.
Northrop Grumman Corporation
The Boeing Company
United Technologies Corp.
Rockwell International Corp.
(8 of 11)

AUTOMOTIVE
Delphi Automotive Systems
Robert Bosch GmbH
Denso Corp.
Honda Giken Kogyo KK
Ford Motor Company
(5 of 15)

BIOTECHNOLOGY/PHARMACEUTICALS
Pfizer Inc.
Caliper Technologies Corp.
Affymetrix Inc.
Symyx Technologies Inc.
Roche Holding Ltd.
(18 of 25)

CHEMICALS
3M
The Procter & Gamble Co.
E I DuPont de Nemours & Co.
Bayer AG
BASF Group
(8 of 18)

COMPUTERS
IBM
Hewlett-Packard Company
Fujitsu Limited
NEC Corporation
Microsoft Corp.
(17 of 24)

ELECTRONICS
Hitachi Ltd.
Matsushita Electric Industrial Co Ltd.
Canon Inc.
Toshiba Corporation
Sony Corporation
(4 of 21)

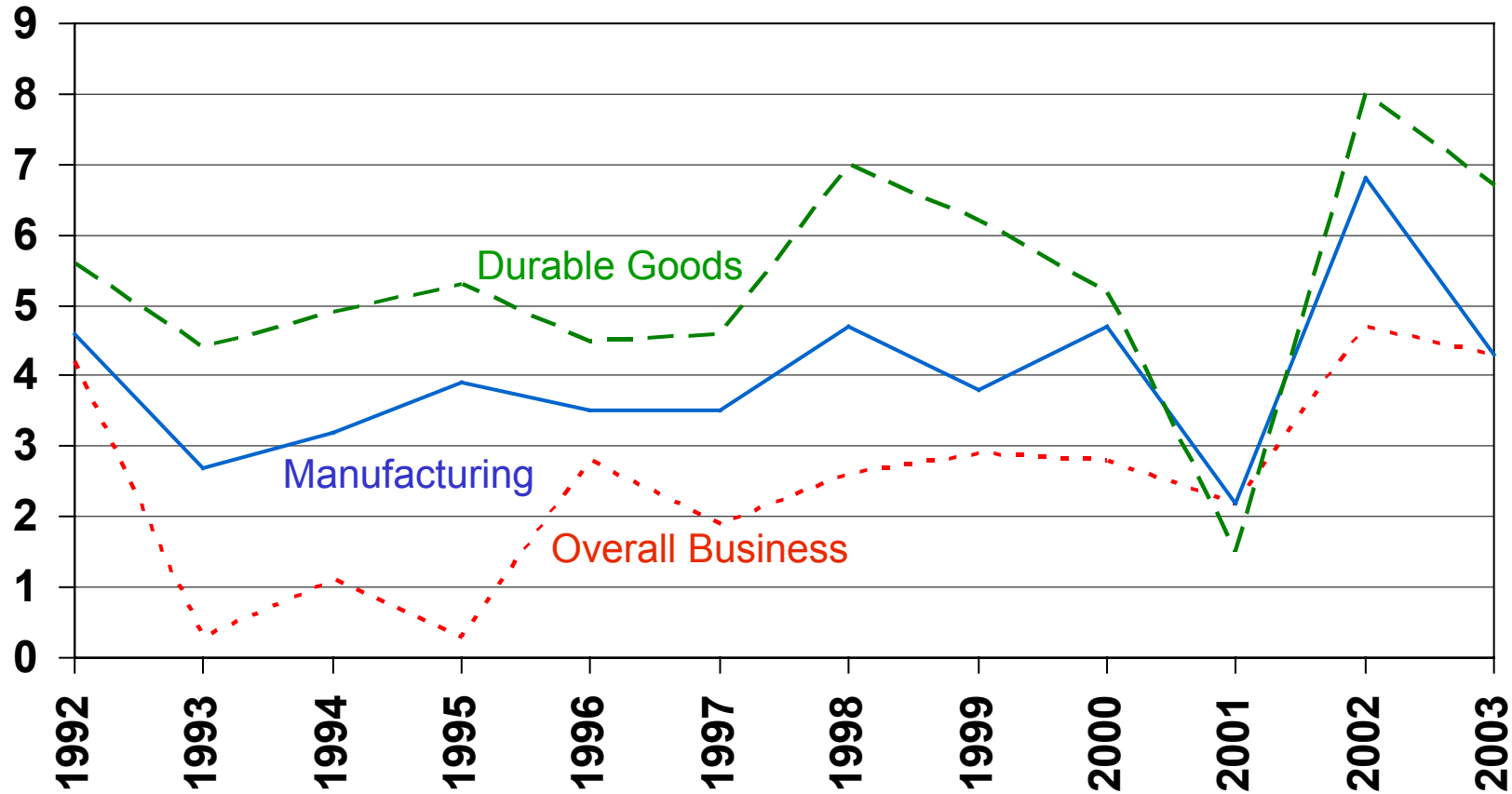
SEMICONDUCTORS
Micron Technology, Inc.
Intel Corp.
Advanced Micro Devices Inc.
Samsung Electronics Co. Ltd.
Applied Materials Inc.
(13 of 21)

TELECOMMUNICATIONS
Lucent Technologies (3)
Motorola Inc.
Ericsson (LM) Telephone Co. Inc.
Nortel Networks Corp.
Nokia Group
(11 of 15)

Source: *www.technologyreview.com and CHI Research*

U.S. Productivity Growth, 1992-2003

(Percent growth per year)



Source: U.S. Department of Labor

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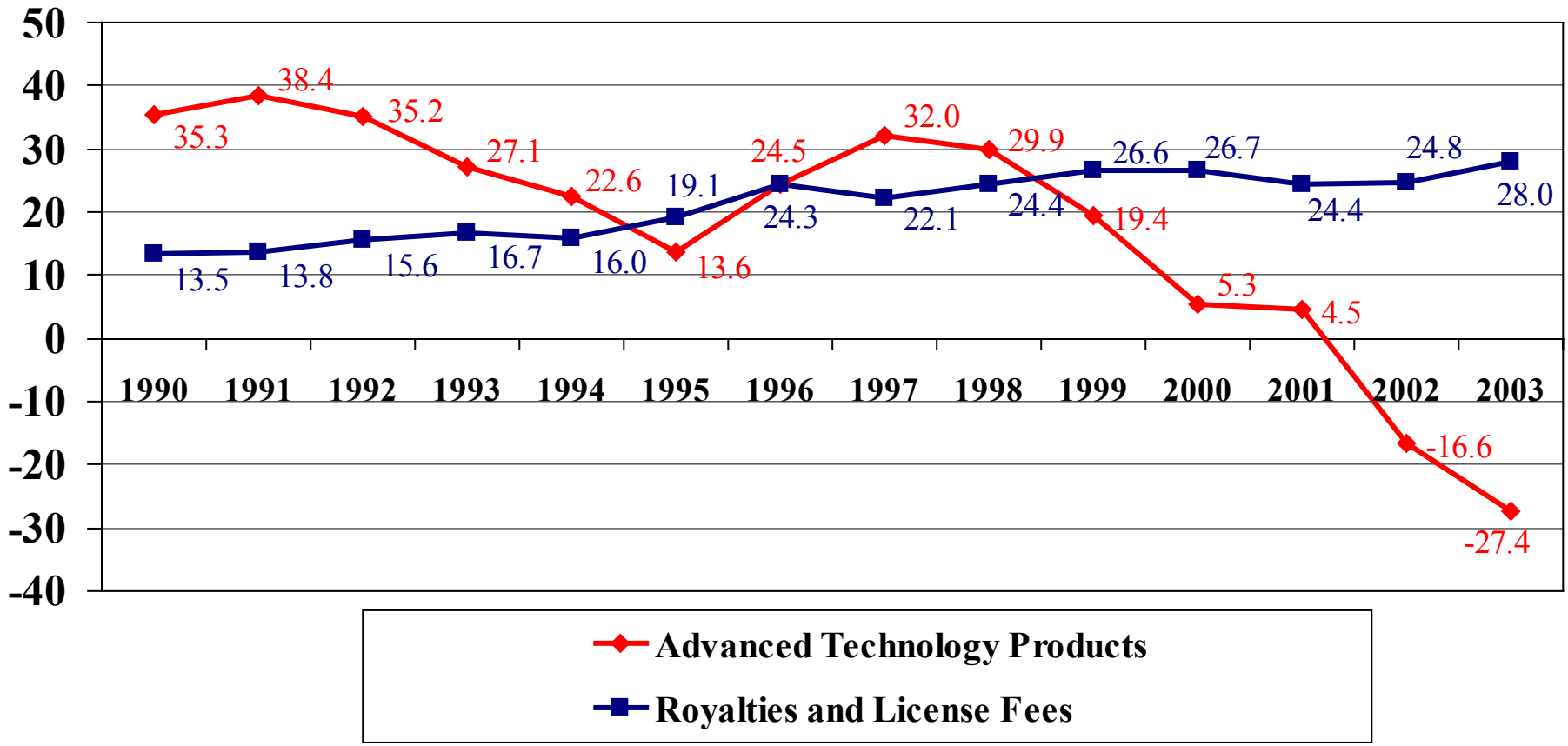
Total Trade Balance in Advanced Technology Products and Royalties and License Fees, 1990-2003



Source: U.S. Census Bureau, BEA

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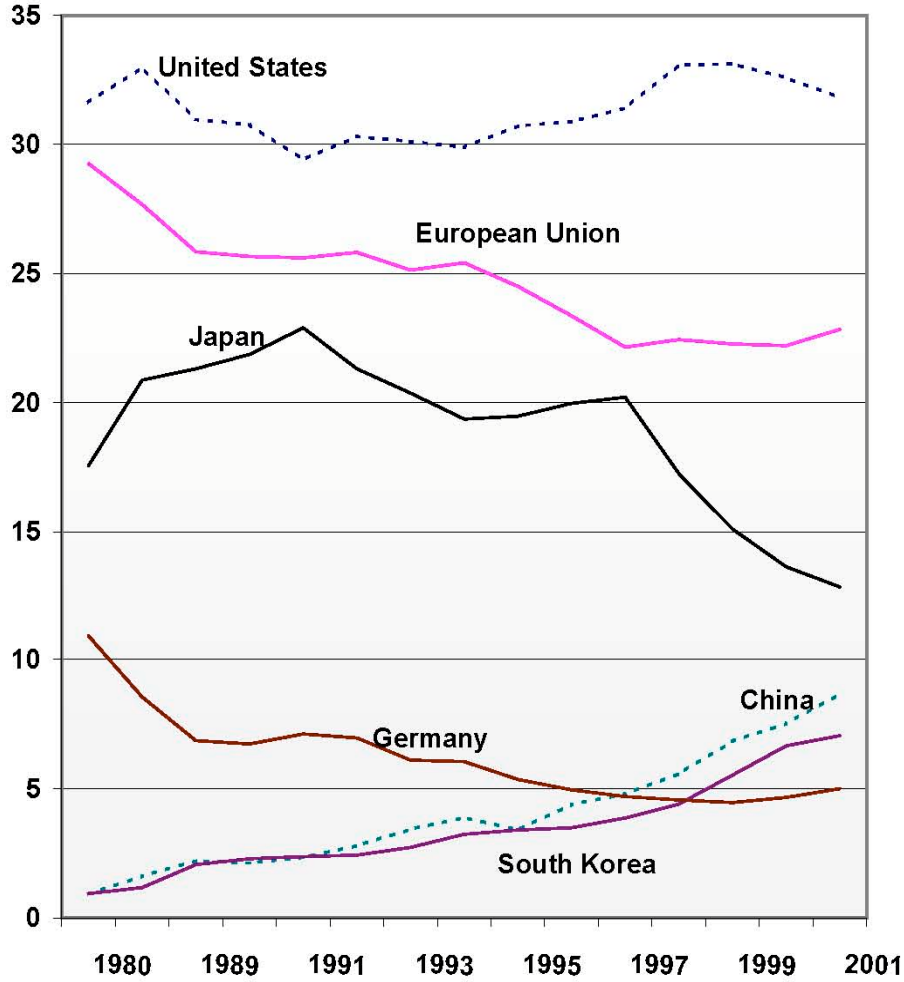
Global High-Technology Market Share, by selected Country/Region: 1980-2001

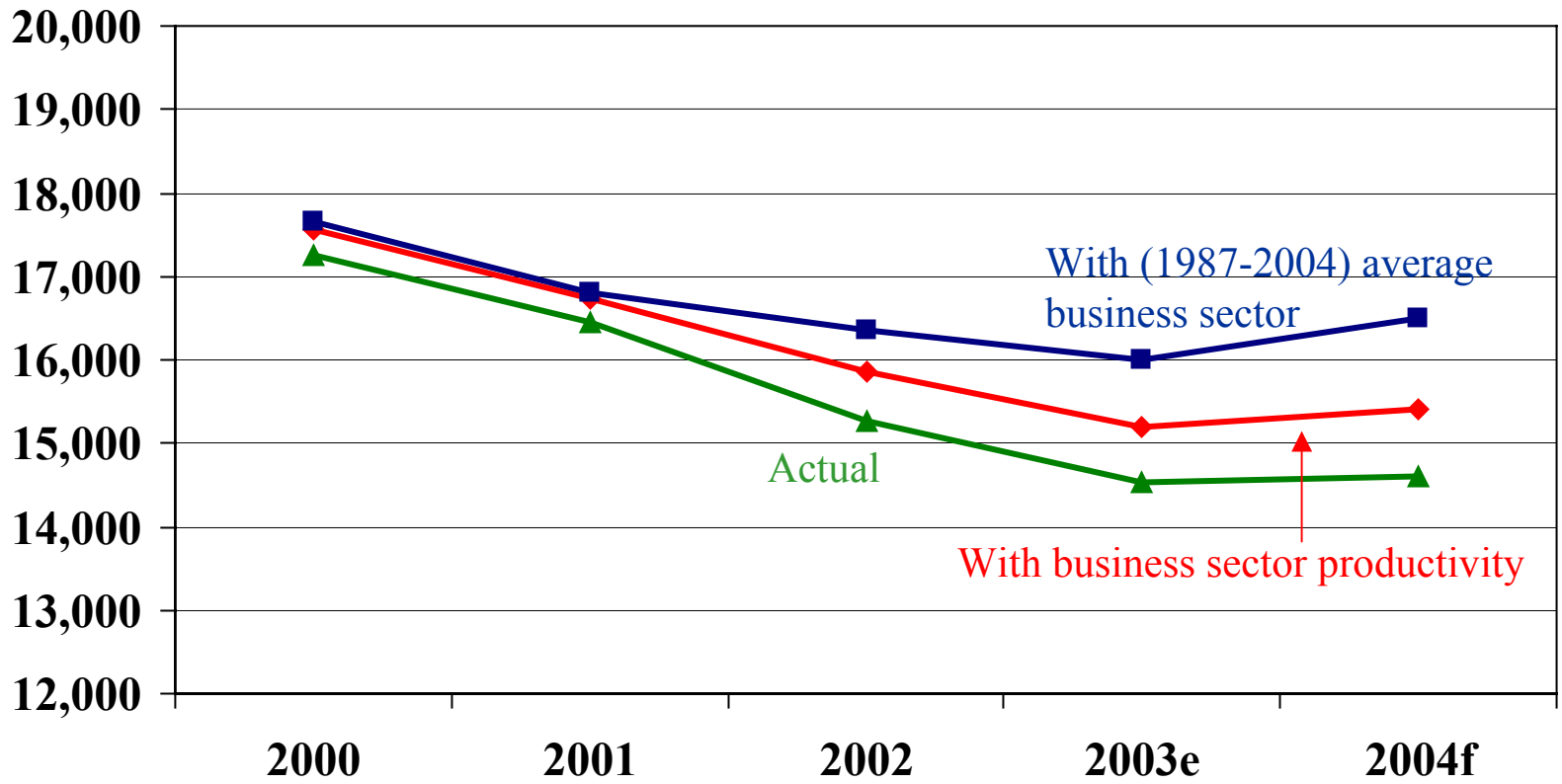
(Percent)



NOTE: Other sources include nonprofit, academic, and non-Federal government.

SOURCES: National Science Foundation, Division of Science Resources Statistics, National

Manufacturing Employment MAPI Projections Under Different Productivity Scenarios



Source: BLS and Manufacturers Alliance/MAPI projections

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Productivity in Developing and Developed Economies

Levels of GDP per hour worked, 1990-2002, U.S. = 100

	1990	1995	1997	1999	2001	2002
U.S.	100.0	100.0	100.0	100.0	100.0	100.0
European Union	84.8	90.4	89.7	88.1	88.9	86.9
Japan	70.7	73.0	74.3	74.3	74.0	72.5
East Asia (4)	35.6	43.1	45.7	46.4	48.9	
SE Asia (4)	11.7	14.7	14.6	12.8	13.1	
China	6.3	8.2	8.8	9.4	9.0	
South Asia	6.1	6.8	7.0	7.1	7.3	

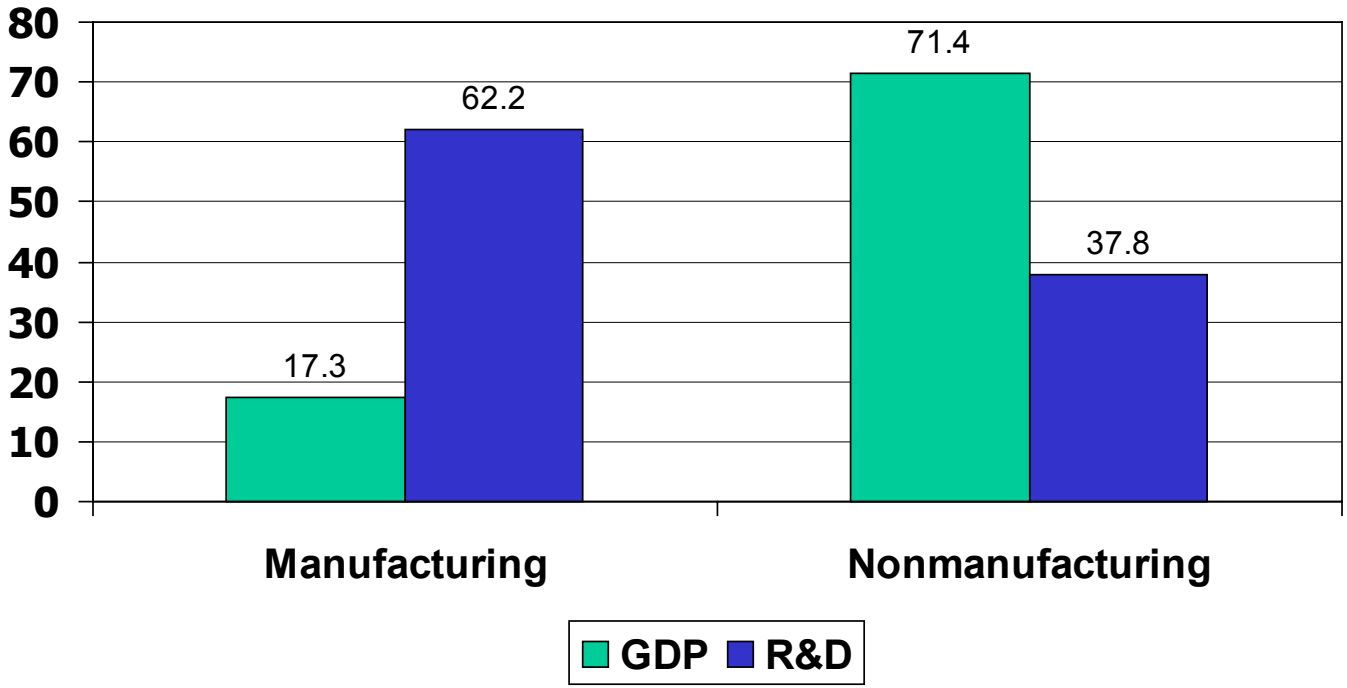
East Asia: Korea, Taiwan, Hong Kong, Singapore
Southeast Asia: Malaysia, Indonesia, Thailand, Philippines
South Asia: India, Bangladesh, Sri Lanka, Pakistan

Source: The Conference Board

Reasons for Higher Productivity Growth in Manufacturing

- Emphasis on research and innovation
- New technology development
- Flexible, efficient management practices such as Lean, Six Sigma
- Greater exposure to global markets
  - Bigger markets
  - More competition
  - More cross-border joint ventures

Major Industry Sector Shares of GDP and R&D Performance, 2000



"Especially important is the fact that the service sector acquires most of its technology from manufacturing firms. . . This fact emphasizes the substantial dependency of services on manufacturing firms for technology and thus the critical role of the myriad communications and market transactions between the two sectors."

Source: G. Jassey, R&D and Long-Term Competitiveness: Manufacturing's Central Role in a Knowledge-Based Economy (National Institute of Standards and Technology)

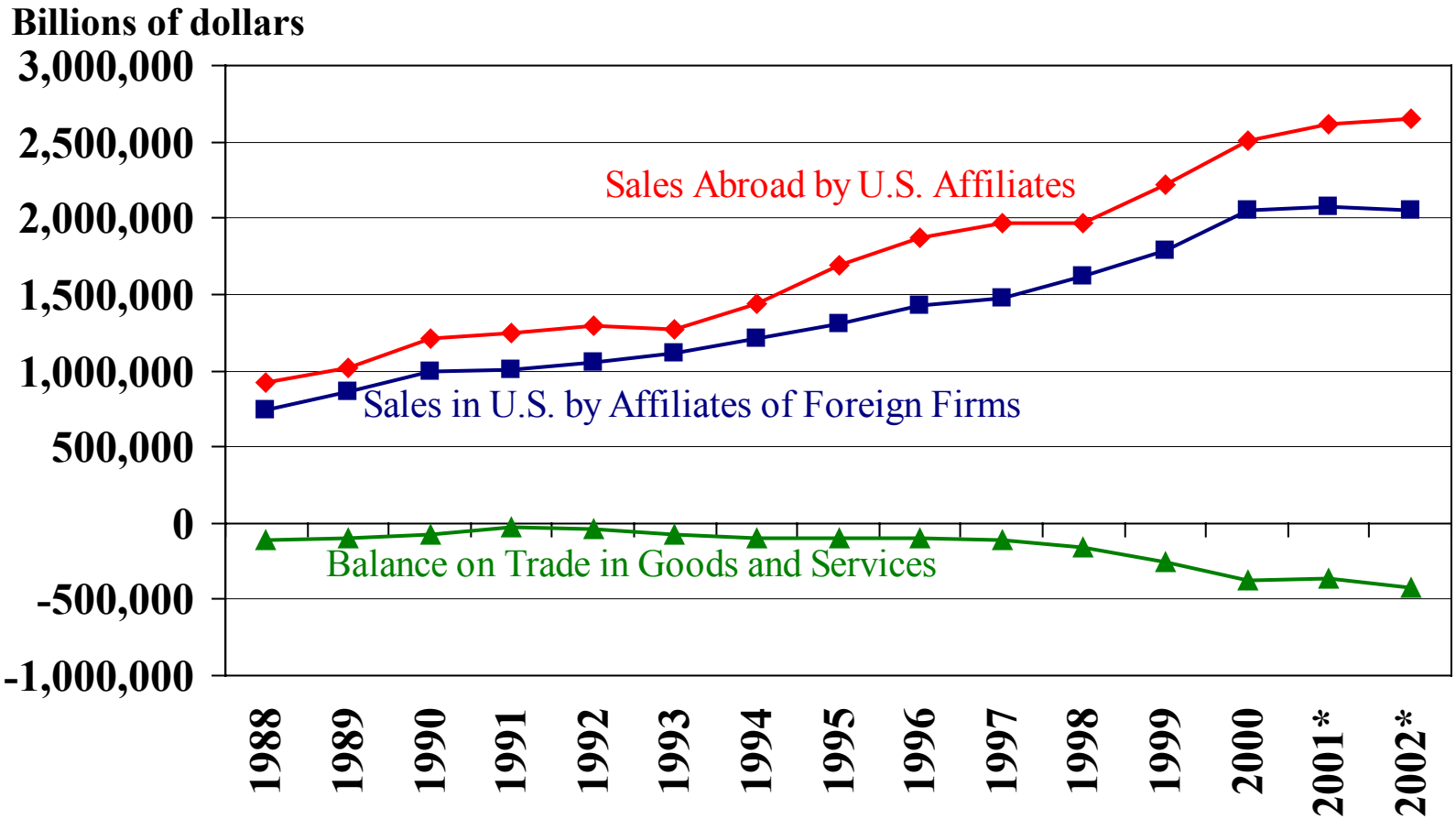
Productivity Growth by Industry, 1990-2000

(Average annual rate of change)

Related Service Industries	1990-1995	1995-2000	1990-2000
Wholesale trade	2.7	4.0	3.3
Durable goods	4.8	6.1	5.4
Nondurable goods	0.2	1.2	0.7
Warehousing	4.4	-2.0	1.2
Long-distance trucking	2.4	0.9	1.7
Rail transportation	5.5	4.5	5.0
Retail trade	1.6	3.2	2.4

Source: U.S. Department of Labor, Bureau of Labor Statistics

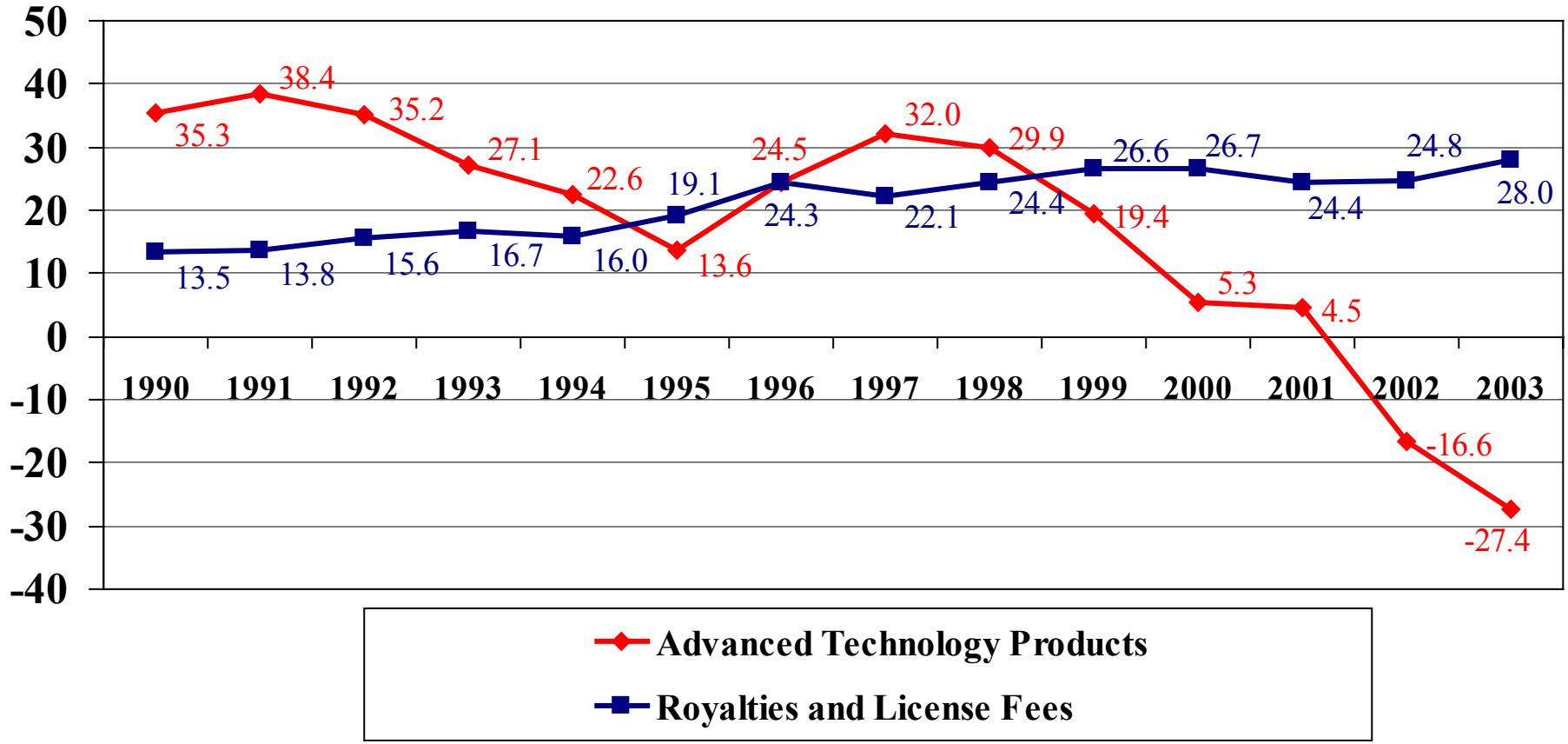
U.S. Trade and Sales by Foreign Affiliates, 1988-2002



*Estimate

Source: Bureau of Economic Analysis, Department of Commerce and *Economic Report of the President, 2003*

Total Trade Balance in Advanced Technology Products and Royalties and License Fees, 1990-2003



Source: U.S. Census Bureau, BEA

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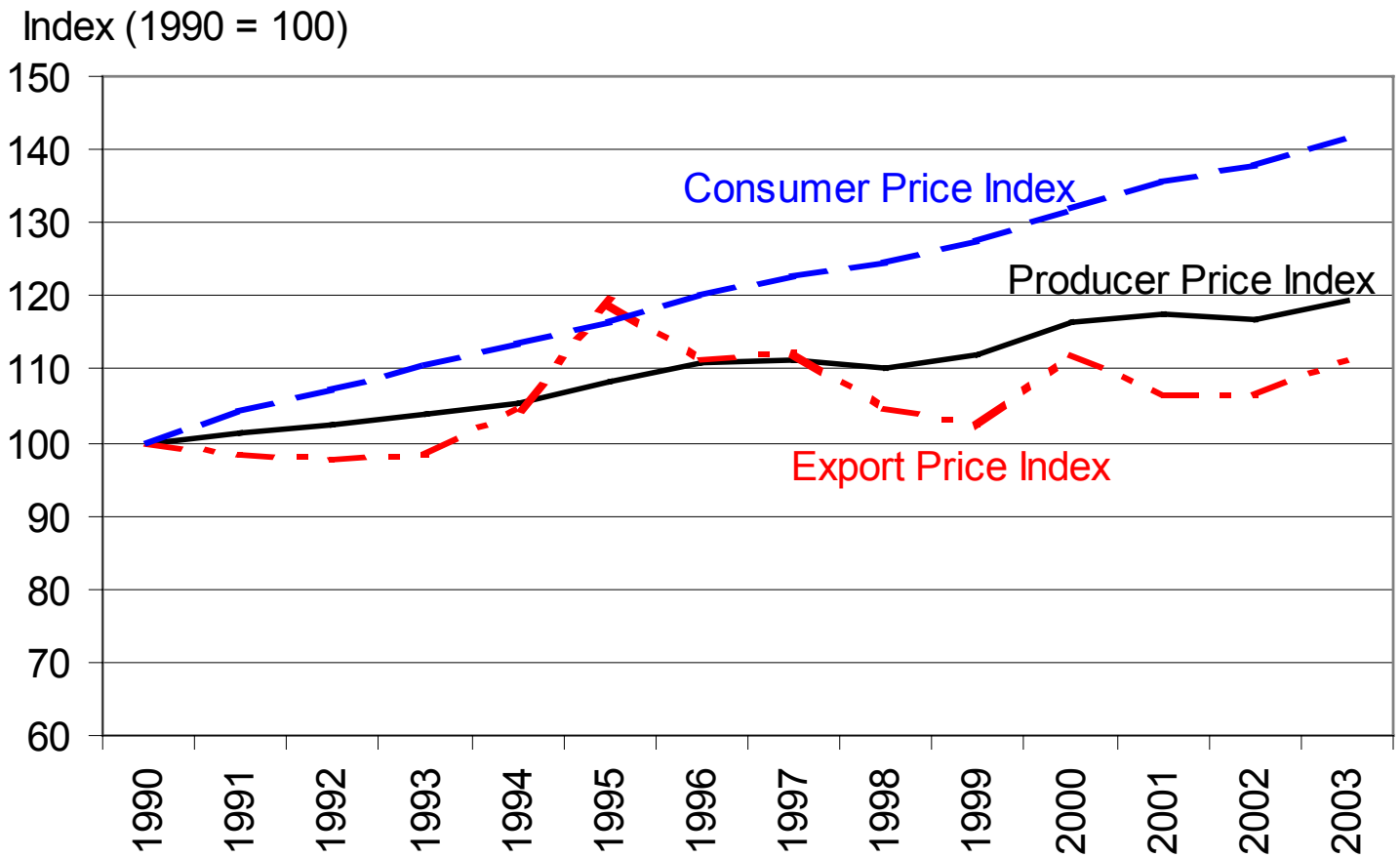
Producer Price Index for Manufacturing Industries and Export Price Index for Industrial Supplies, 1990-2003



Source: U.S. Bureau of Labor Statistics
Note: 2003 reflects data through September.

Percent Changes in Prices of Selected Commodities, Feb 2003 – Feb 2004

Zinc, LME, high grade	38.2%
Aluminum, std grade	18.5%
Coal (for export)	63.3%
Copper, grade A cathodes	63.6%
Raw lumber (export from U.S. Pacific Coast)	18.6%
Rubber (Malaysian)	37.6%
Uranium	58.9%
Nickel, melting grade	75.4%
Tin, std grade	45.7%

Source: International Monetary Fund

The Burden of the Strong Dollar on U.S. Manufacturing's Raw Cost Competitiveness Relative to Its Nine Largest Trading Partners, 1990-2003

	Increase/decrease relative to U.S. dollar	Trade-weighted effect on U.S. dollar
Canada	-15.6%	-2.7%
Mexico	-38.6%	-4.1%
Japan	22.2%	2.7%
China	-36.8%	-3.3%
Germany	-9.2%	-0.5%
United Kingdom	-9.1%	-0.4%
Korea	-40.1%	-1.5%
Taiwan	-21.7%	-0.7%
France	-5.6%	-0.2%
Trade-weighted average of above countries		**-10.8**

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Effect of Key "Overhead Costs" on Raw Cost Index of Nine Largest U.S. Trading Partners, 2002

(U.S. dollars per hour)

	United States	Average of nine partners	Canada	Mexico	Japan	China	Germany	United Kingdom	South Korea	Taiwan	France
Raw cost index	**24.30**	**19.30**	**27.57**	**8.11**	**16.92**	**5.34**	**29.60**	**28.30**	**23.96**	**16.41**	**26.50**
Difference relative to U.S. costs in percent											
Corporate tax rate	–	-5.6%	-3.4%	-6.0%	2.0%	-15.0%	-0.4%	-10.0%	-10.3%	-15.0%	-5.7%
Employee benefits	–	-5.5%	-4.8%	-9.4%	-9.4%	-12.6%	3.6%	-5.1%	9.0%	-11.5%	10.7%
Tort costs	–	-3.2%	-3.1%	N/A	-3.3%	N/A	-0.7%	-3.4%	N/A	N/A	-1.3%
Natural gas costs	–	-0.5%	-6.0%	-2.3%	12.5%	-2.3%	0.6%	2.1%	4.1%	15.3%	-4.2%
Pollution abatement	–	-3.5%	-2.8%	N/A	-2.3%	N/A	-2.4%	-3.0%	N/A	N/A	-1.5%
Manufacturing production costs relative to the United States accounting for differences in overhead costs (dollars per hour)											
Effective cost index	**24.30**	**16.02**	**22.46**	**6.19**	**16.64**	**3.50**	**29.77**	**23.14**	**22.67**	**12.85**	**25.77**

Source: Author's calculations based on data in subsequent tables and charts

Note: Data for tort costs and regulatory compliance costs are limited to the industrialized partners. Conservative assumptions have been made in estimating the missing values, as described in later sections. Thus, the absence of these data likely understates the overall cost advantage of U.S. trading partners.

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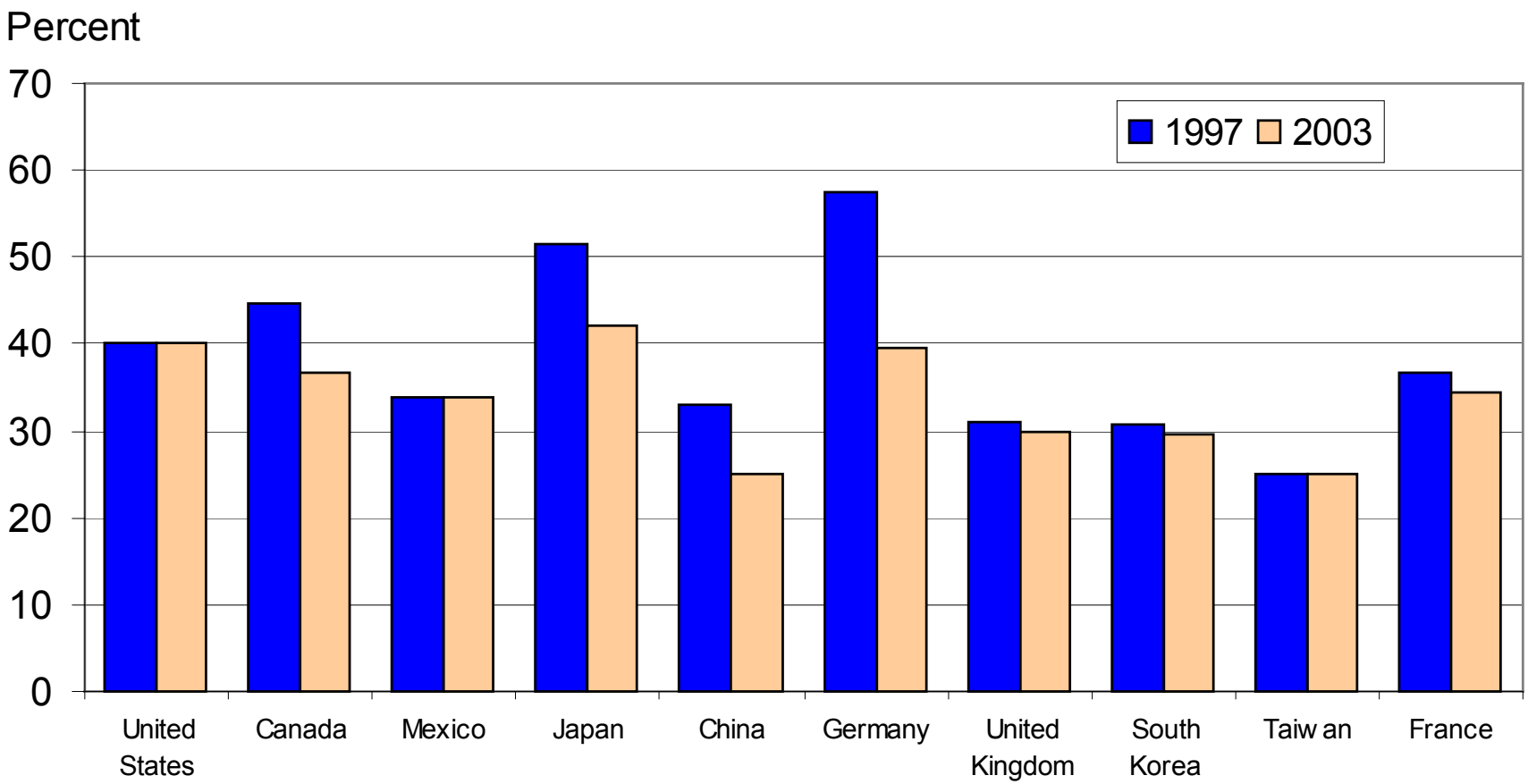
Statutory Corporate Tax Rates for the United States and Its Nine Largest Trading Partners, 1997 and 2003



Source: KPMG Corporate Tax Rate Survey

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Burden of the Corporate Tax Rates on U.S. Manufacturing's Raw Cost Competitiveness Relative to the Nine Largest U.S. Trading Partners, 2003

	Statutory corporate tax rate (percent)	Difference from U.S. (percentage points)
United States	40.0	—
Canada	36.6	-3.4
Mexico	34.0	-6.0
Japan	42.0	2.0
China	25.0	-15.0
Germany	39.6	-0.4
United Kingdom	30.0	-10.0
South Korea	29.7	-10.3
Taiwan	25.0	-15.0
France	34.3	-5.7
Trade-weighted average of above countries		**-5.6**

Source: Chart 6 and author's calculations

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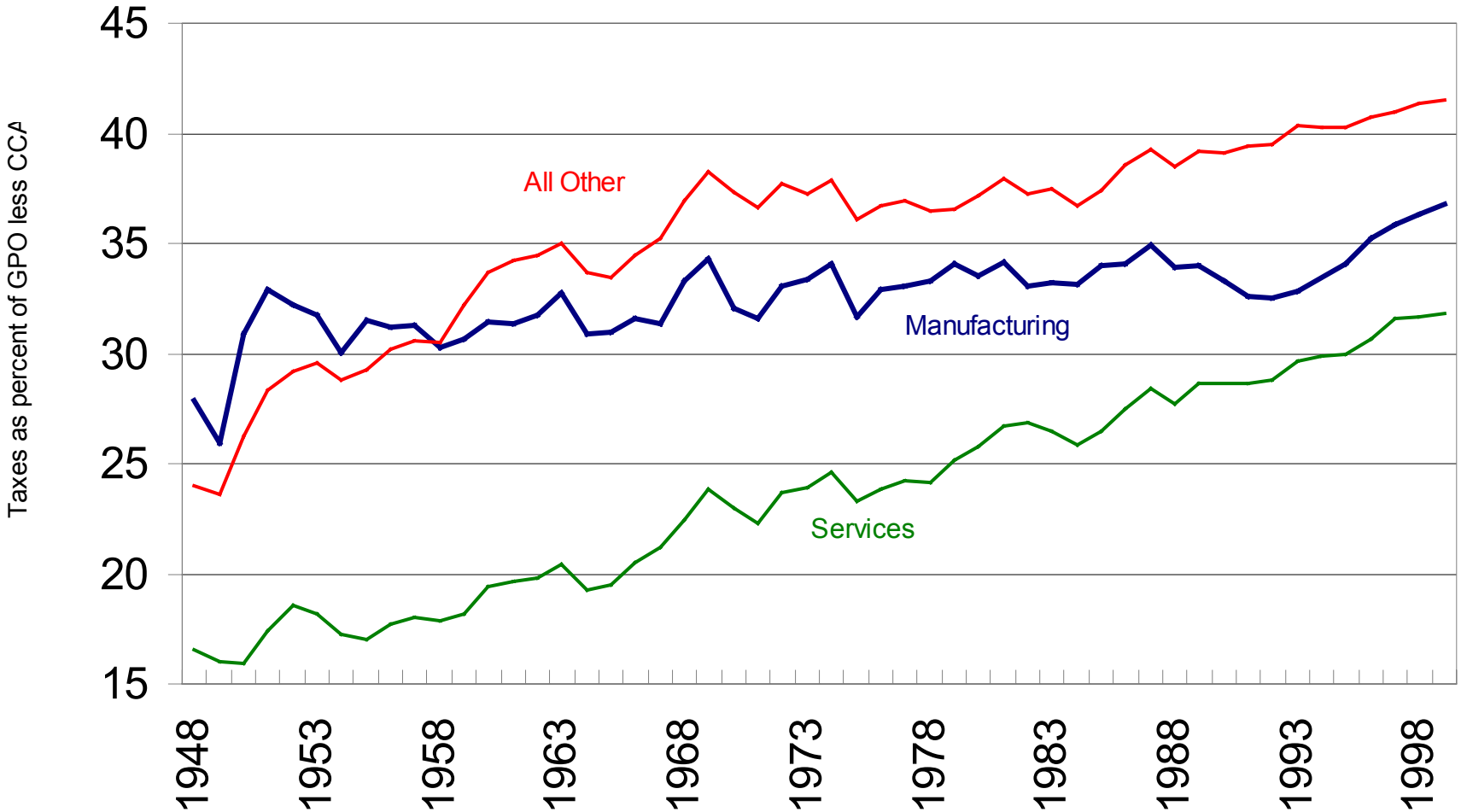
Effective Average Tax Rates on Net Business Income



Source: Fiscal Associates Tax Model

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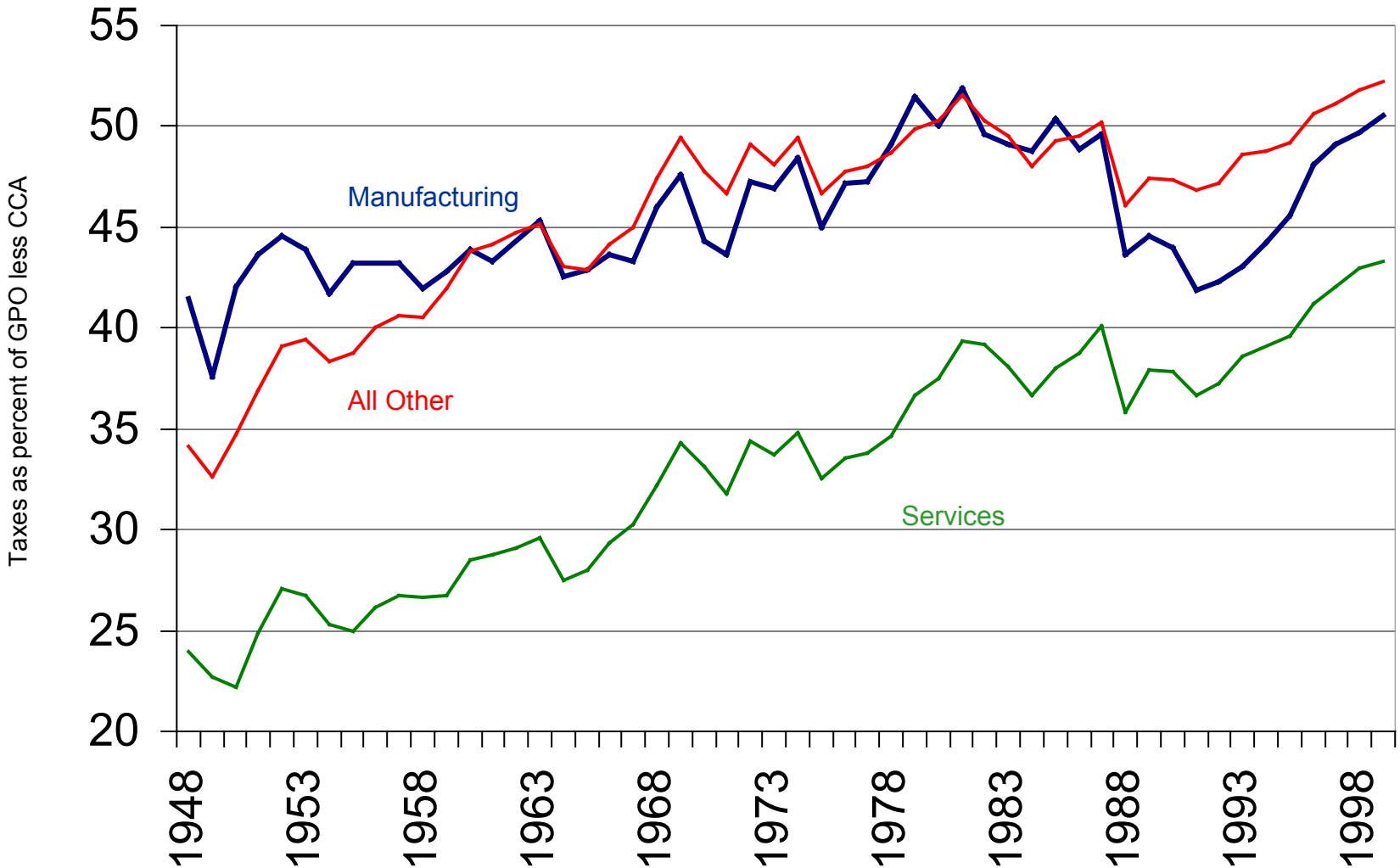
Marginal Tax Rates on Net Income



Source: Fiscal Associates Tax Model

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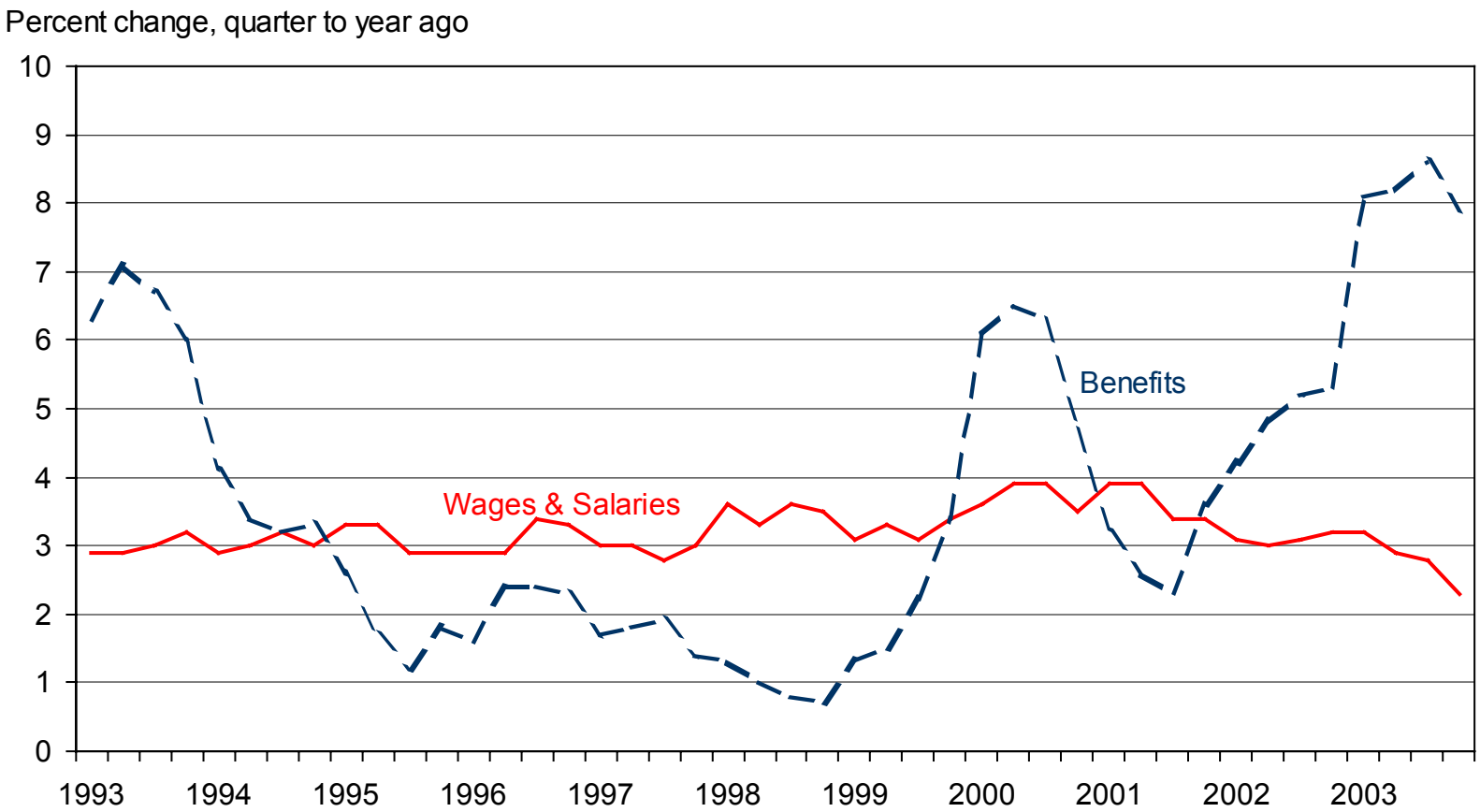
Employment Cost Index, Manufacturing Workers, 1993-2003



Source: U.S. Department of Labor, Bureau of Labor Statistics

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Benefits as a Percentage of Total Compensation for Manufacturing Production Workers, United States and Its Nine Largest Trading Partners, 2001

	Benefits as percent of total compensation	Percentage point difference from U.S.
United States	20.6	
Canada	15.8	-4.8
Mexico	11.2	-9.4
Japan	11.2	-9.4
China	8.0	-12.6
Germany	24.2	3.6
United Kingdom	15.5	-5.1
South Korea	29.6	9.0
Taiwan	9.1	-11.5
France	31.3	10.7
Trade-weighted average of above countries		**-5.5**

Sources: U.S. Bureau of Labor Statistics and "The Labor Market Dynamic in Post-Reform China: History, Evidence, and Implications," Manufacturers Alliance/MAPI, ER-561e, September 2003
Note: China data include health benefits only.

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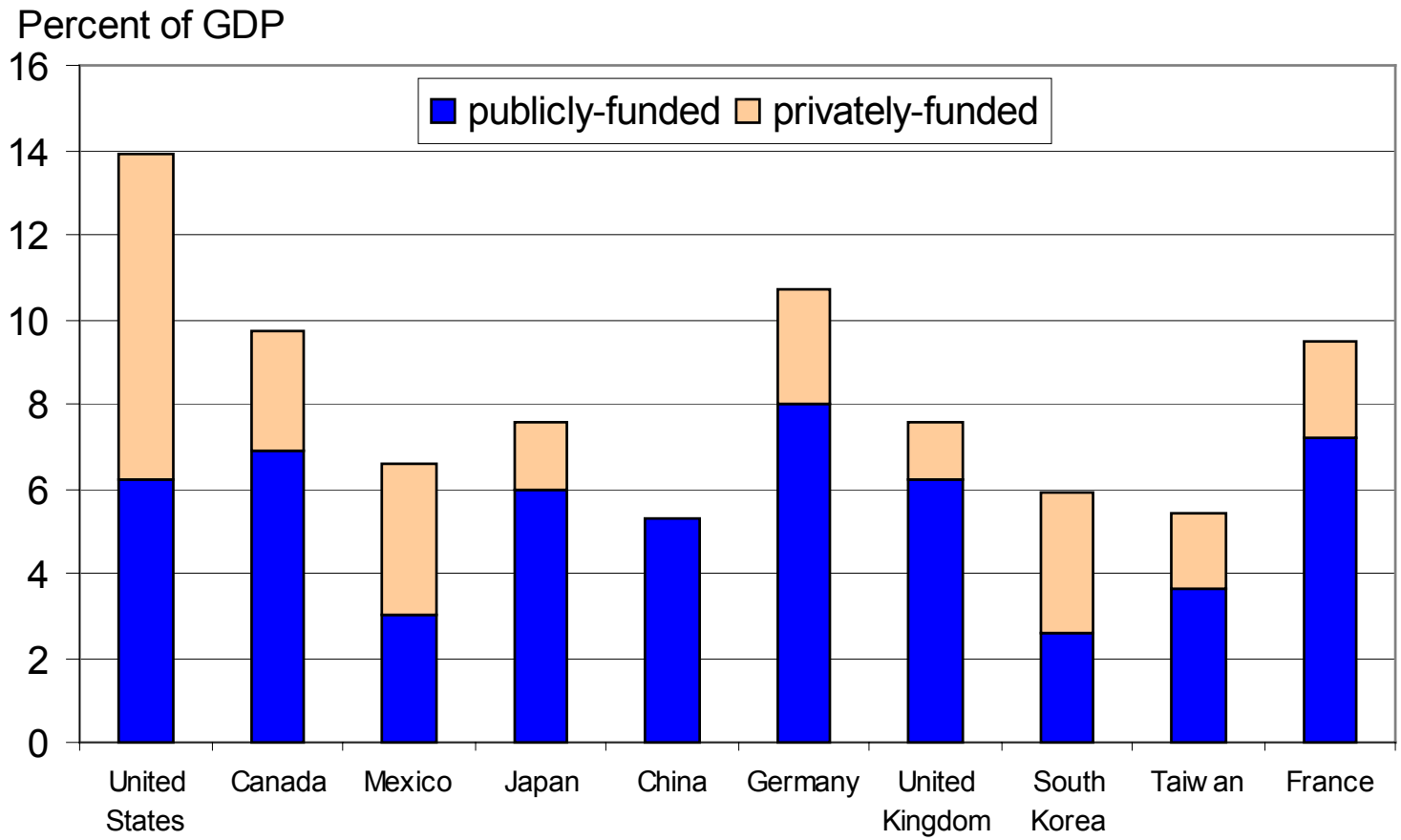
Publicly and Privately Funded Health Care Expenditures in the United States and Its Nine Largest Trading Partners, 2001



Source: Organization for Economic Cooperation and Development and World Bank
Notes: Data for China reflects total health expenditure; no public-private disaggregation is available. Data for Taiwan date from 1996 and are taken from Eva Liu and Joseph Lee, "Health Care Expenditure and Financing in Taiwan," Hong Kong Provisional Legislative Council Secretariat report, June 1998.

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Cost of Tort Litigation, United States and Its Nine Largest Trading Partners, 2000

	Tort costs as percent of GDP	Manufacturing tort costs as percent of manufacturing output	Percentage point difference from U.S.
United States	2.0	4.5	—
Canada	0.8	1.4	-3.1
Mexico	N/A	0.6*	-3.9*
Japan	0.8	1.2	-3.3
China	N/A	0.6*	-3.9*
Germany	1.3	3.8	-0.7
United Kingdom	0.6	1.1	-3.4
South Korea	N/A	0.6*	-3.9*
Taiwan	N/A	0.6*	-3.9*
France	0.8	3.2	-1.3
Trade-weighted average of above countries			**-3.2**

Source: Tillinghast-Towers Perrin and author's calculations

* For countries lacking data (Mexico, China, South Korea, and Taiwan), this analysis conservatively assumes that their relative manufacturing tort costs are equal to half that of the United Kingdom, the lowest of all countries with available data.

Manufacturing Compliance Costs Associated With U.S. Regulations Compliance Activities, 1992 and 1997

(Expressed in constant 2000 dollars)

	Total cost, 1997 ($billions)	Per-employee cost, 1997
Environmental	69	3,691
Economic	48	2,553
Workplace	16	838
Tax compliance	15	822
Total	**147**	**7,904**

Source: W. Mark Crain and Thomas D. Hopkins, "The Impact of Regulatory Costs on Small Firms," Office of Advocacy, Small Business Administration, October 2001, Table 9A.

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Cost of Pollution Abatement, United States and Its Nine Largest Trading Partners, Late 1990s

	Pollution abatement costs as percent of GDP	Manufacturing pollution abatement costs as percent of manufacturing output	Percentage point difference from U.S.
United States	1.6	7.6	—
Canada	1.1	4.8	-2.8
Mexico	0.8	3.1	-4.5
Japan	1.4	5.3	-2.3
China	N/A	1.6*	-6.1*
Germany	1.5	5.2	-2.4
United Kingdom	1.0	4.7	-3.0
South Korea	1.7	4.3	-3.3
Taiwan	N/A	1.6*	-6.1*
France	1.4	6.1	-1.5
Trade-weighted average of above countries			**-3.5***

Source: Organization for Economic Cooperation and Development

Note: As in Table 9, the analysis conservatively assumes that countries with missing data (China and Taiwan) bear a pollution abatement burden equal to half the lowest value of other trading partners (in this case, Mexico).

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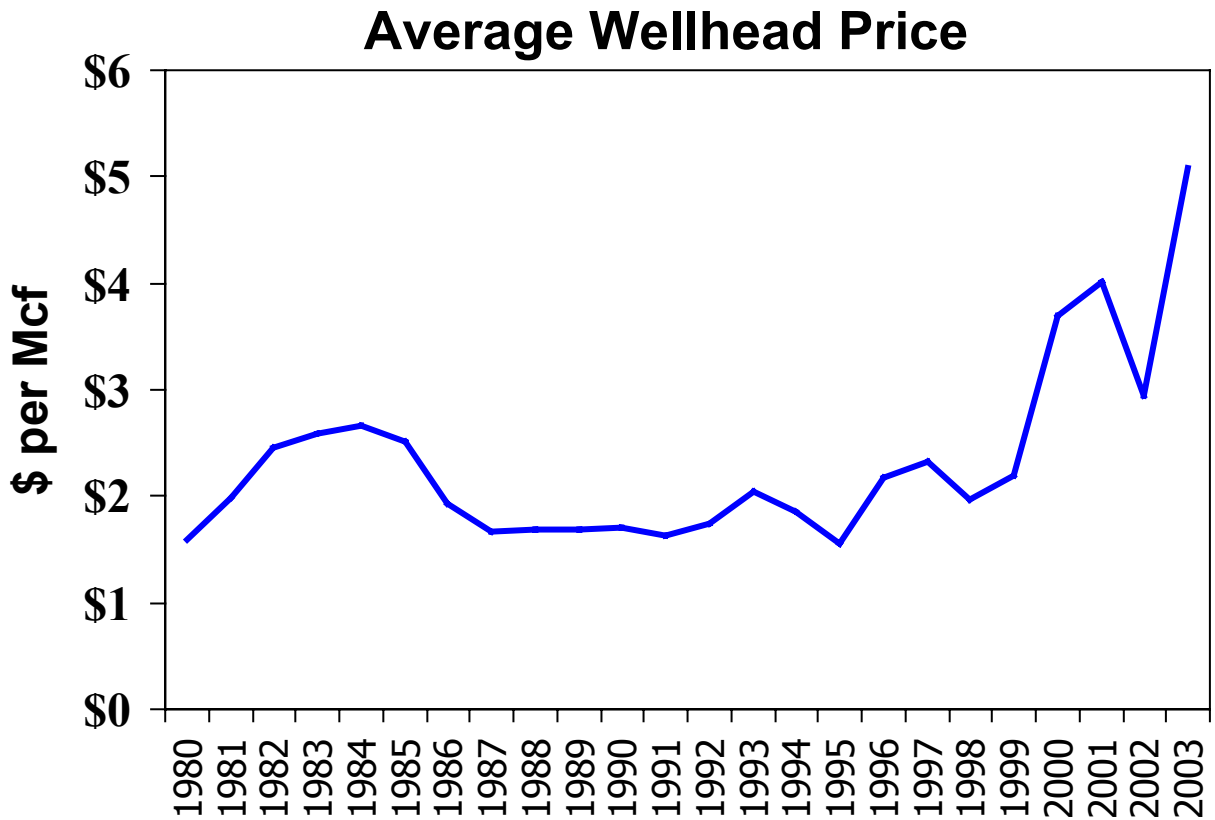
U.S. Natural Gas Prices



Source: U.S. Department of Energy/Energy Information Administration

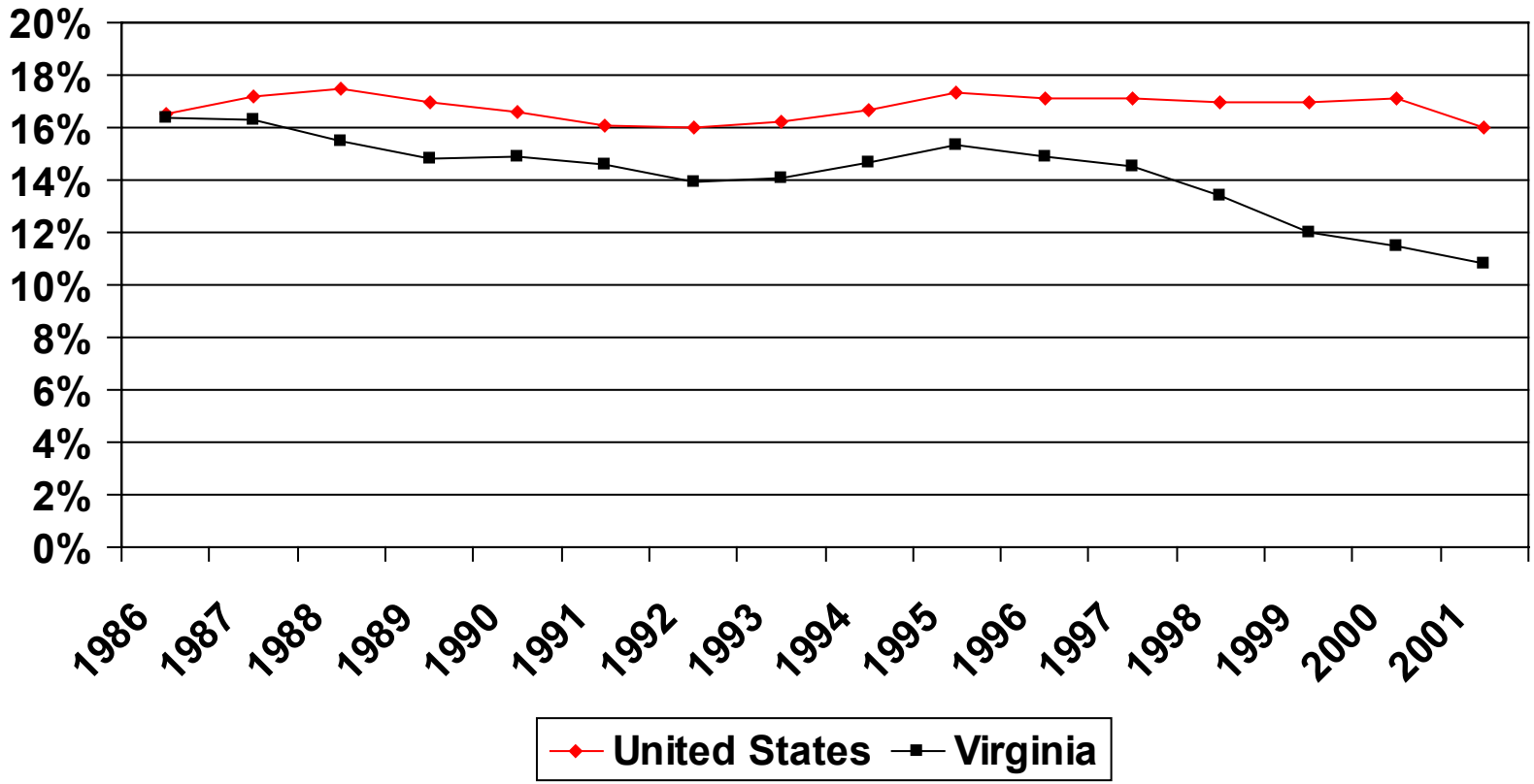
Natural Gas Prices in the United States and Its Nine Largest Trading Partners, 1994–2001

(Dollars per million British thermal units)

	1994	2001	Percent change
United States	$2.87	$4.83	68.3
Canada	1.98	2.74	38.4
Mexico	2.01	4.12	105.0
Japan	11.75	10.24	-12.8
China	N/A	N/A	N/A
Germany	4.65	4.74	1.9
United Kingdom	3.57	3.37	-5.6
South Korea	N/A	N/A	N/A
Taiwan	7.11	7.27	2.3
France	3.57	4.71	31.9

Source: U.S. Energy Information Administration

Manufacturing's share of real GDP In Virginia and the U.S.



Source: U.S. Department of Commerce, Bureau of Economic Analysis.

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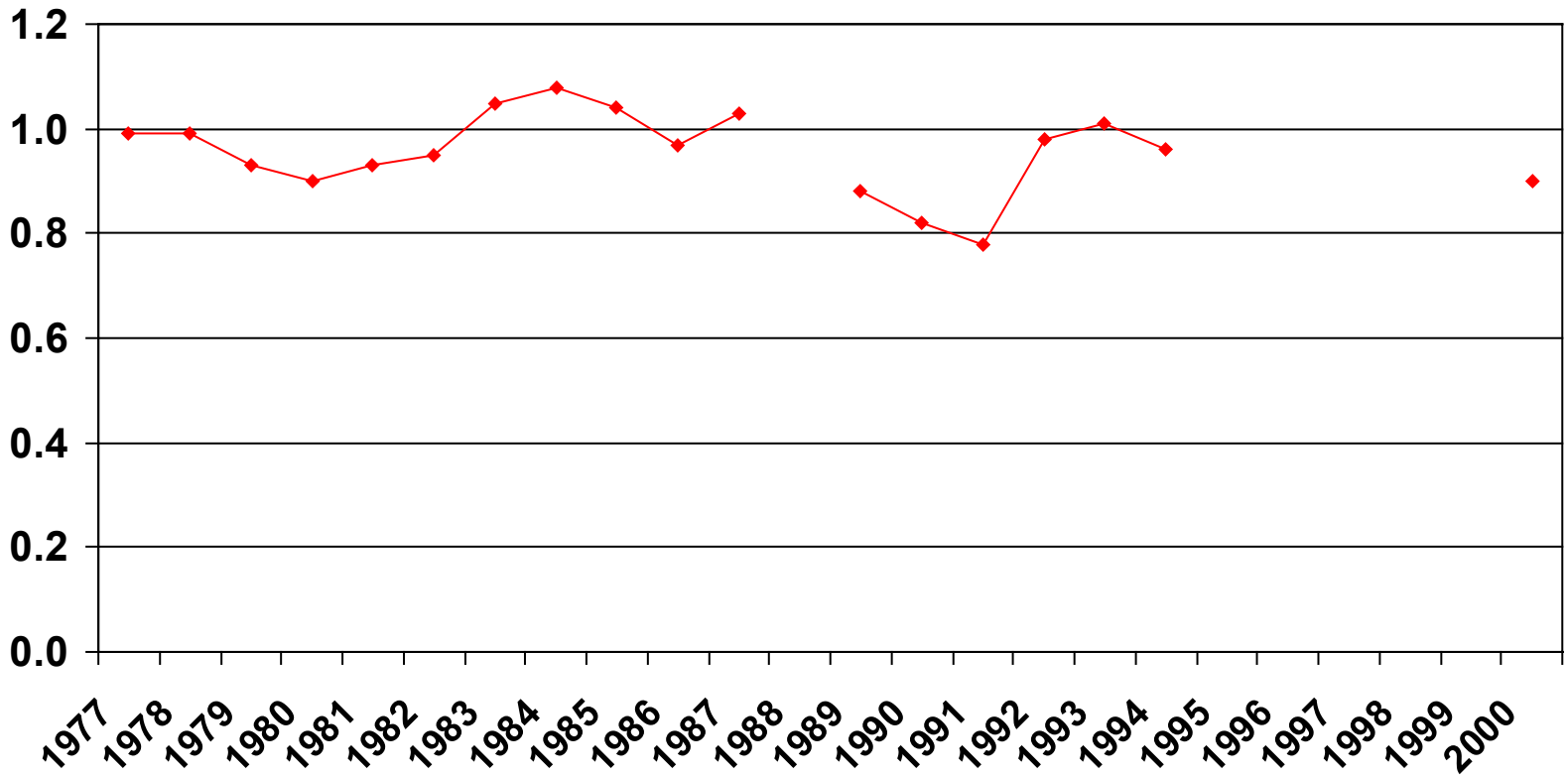
Virginia taxes at a glance

	Virginia (rank)	U.S. average	Best state	Worst state
Business tax climate index	6.36 (21)	5.97	8.30 (Wyoming)	3.97 (Mississippi)
Corporate income tax component	9.00 (5)	7.67	10 (4 states)	1 (Alaska)
Individual income tax component	3.13 (31)	5.00	10 (7 states)	0.91 (Montana)
Sales/receipts tax component	8.62 (6)	6.27	10 (5 states)	2.37 (Washington)
Conformity of tax base to Federal base component	6.81 (29)	7.01	10 (3 states)	2.85 (New York)
Fiscal balance component	4.22 (18)	3.89	9.21 (New Hampshire)	1.14 (Maine)
ADDENDUM: State tax receipts per capita	$1,756	$1,884	$1,458 (Colorado)	$2,518 (Vermont)

Source: Tax Foundation and Federation of Tax Administrators.

Index of stringency of VA environmental regulations

(National average = 1.0)



Source: Arik Levinson, "An Industry-Adjusted Index of State Environmental Compliance Costs" July 1999 (based on BEA Pollution Abatement Costs and Expenditures survey) and Resource Renewal Institute.

What Is To Be Done?

- Allow currency rates to seek optimal values (especially in Asia)
- Reduce regulatory and tort litigation costs
- Attack rise in health care costs
- More oil and gas exploration in North America
- Reduce corporate tax burden and level international playing field
- Increase access to foreign markets
- Improve climate for innovation and technology development